DOCUMENT RESUME

ED 339 932 CG 023 833

TITLE Adolescent Steroid Use.
INSTITUTION Office of Inspector General (DHHS), Washington, DC.
REPORT NO OEI-06-90-01080
PUB DATE 90
NOTE 44p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Adolescents; *Drug Abuse; Drug Education; Incidence; Prevention; Secondary Education; Trend Analysis
IDENTIFIERS *Steroids

ABSTRACT

The study focused on non-medical steroid use by adolescents according to data obtained from the National Institute on Drug Abuse, professional literature, 30 key informants knowledgeable in steroid issues, and 72 current or former steroid users. The findings indicated: (1) over 250,000 adolescents, primarily males, used or have used steroids, and the number is growing; (2) over half the adolescents who use steroids have tried them for the first time by age 16; (3) steroid users, in general, are highly motivated people who train intensely to improve themselves or to achieve a positive goal and who believe they are health conscious; (4) adolescents have a special susceptibility to the health risks of stunted growth and adverse psychological effects including dependence; (5) steroid use encourages adolescents to try other drugs for enhancing performance and countering the side effects of steroid use; (6) experts do not believe adolescents are well aware of the potential risks of steroid use, nor is awareness a deterrent to use; and (7) many key informants supported drug testing as a deterrent to adolescent steroid use, but the cost is a serious drawback. From these findings two recommendations emerged: (1) the Department of Health and Human Services should develop a national education strategy to increase adult and adolescent awareness of the problem and to provide educational guidelines for local programs; and (2) the Department, through the Public Health Service, should take the lead in expanding federal understanding of the motivations for the health risks of non-medical steroid use as a basis for informed policy decisions. (LLL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

CG

Department of Health and Human Services

OFFICE OF INSPECTOR GENERAL

ED339932

ADOLESCENT STEROID USE

Richard P. Kusserow
INSPECTOR GENERAL

OEI-06-90-01080

CG023833

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

BEST COPY AVAILABLE

EXECUTIVE SUMMARY

PURPOSE

To describe the non-medical use of steroids by adolescents and to suggest appropriate education or intervention strategies as well as areas needing further research.

BACKGROUND

Anabolic-androgenic steroids ("steroids") are synthetic derivatives of the natural male hormone testosterone. Most who use steroids for non-medical reasons want to maximize the anabolic (growth) properties in order to improve their muscularity, strength, appearance, and/or capacity to train. Steroids do not produce an immediate euphoria at the time of use. Steroids are administered either orally or by injection. Many users take more than one steroid at a time (stacking) for several months (cycles) and usually in dosages that greatly exceed the therapeutic amounts.

Steroid possession and distribution for non-medical purposes are illegal under Federal law. Since the 1950's world class and professional athletes have used steroids to enhance their performance, but more recently evidence has shown high school, and even junior high school, students also use steroids. At the same time researchers are discovering the potential for serious health risks associated with steroid use.

This inspection focuses on non-medical steroid use by adolescents according to the National Institute on Drug Abuse (NIDA), professional literature, 30 key informants knowledgeable in steroid issues, and 72 current or former steroid users. Findings from our companion study on adolescent steroid users are available in a separate report entitled "Adolescents and Steroids: A User Perspective," OEI 06-90-01081.

FINDINGS

Over One-Quarter Million Adolescents, Primarily Males, Use Or Have Used Steroids, And Their Numbers Are Growing.

The NIDA reported 3 percent of the Class of 1989 (4.7% males and 1.3% females) had used steroids in their lifetime. Other smaller studies show higher rates for males. Our key informants agree that 5 to 11 percent is an accurate range of male use, but they also say the usage rates are increasing.

Adolescent Steroid Use Starts Early And Often Follows A Prolonged, Intense Pattern.

The data also show that over half the adolescents who use steroids have tried them for the first time by age 16. The majority of our sample are "heavy" users who increased steroid dosages, variety, and cycle length over time.

Adolescent Steroid Use Is Motivated By Socially Acceptable Values And Life-Stage Concerns With Appearance And Peer Approval.

Key informants say steroid users, in general, are highly motivated people who train intensely to improve themselves or to achieve a positive goal and who believe they are health conscious. Adolescents, typically very concerned about their appearance and peer approval, use steroids primarily to improve athletic performance and appearance. Key informants and users believe that steroids work to produce the physical effects adolescents desire. Furthermore, adults and famous role models indirectly reinforce adolescent steroid use; non-using peers don't discourage use.

Adolescents Are At Special Risk For Some Adverse Results Of Steroid Use.

Key informants believe adolescent users are more susceptible to the health risks of stunted growth and adverse psychological effects including dependence. Data also suggest steroid use encourages adolescents to try other drugs for enhancing performance and countering the side effects of steroid use.

Although Much Remains Unknown, Experts Link Steroid Use To Serious Psychological And Physical Health Risks.

Prolonged use of steroids concerns our key informants because of what they do and do not know about their effects. Most predict that, if an adolescent uses steroids for one six-week cycle, he will go on to heavy use that could possibly last for years. In fact, many of our users self-report addictive thinking or behavior. The key informants link many adverse physical and psychological effects to steroid use.

Experts Recommend Education Of Adolescents And Adults As The Best Solution To The Steroid Use Problem.

Experts do not believe adolescents are well aware of the potential risks of steroid use nor is awareness a deterrent to use. Our key informants say, nevertheless, education is the most effective means of deterring use. Honest, early, repeated, and clear messages concerning steroid use to adolescents and responsible adults will improve steroid education programs.

Testing And Controlled Substance Status Are Potential Deterrents To Non-Medical Steroid Use.

Many key informants support drug testing as a deterrent to adolescent steroid use, but the cost is a serious drawback. Some object to testing for legal or philosophical reasons. Limiting the black market supply could help control steroid use. Making steroids a controlled substance is seen as beneficial, but perhaps not the only enforcement effort needed.

RECOMMENDATIONS

Develop A National Steroid Education Strategy.

The Department should develop a national education strategy to increase adult and adolescent awareness of the problem and to provide educational guidelines for local programs. An effective program involves more than merely presenting information about the effects of steroids. The message for adolescents must come early and be reinforced in an honest, consistent way from their peers and responsible adults.

Conduct Further Medical And Scientific Research.

The Department, through the Public Health Service, should take the Federal lead in expanding our understanding of the motivations for and health risks of non-medical steroid use as a basis for informed policy decisions.

COMMENTS

We received Departmental comments on the draft report from the Office of the Assistant Secretary for Planning and Evaluation (ASPE) and the Public Health Service (PHS). Both the ASPE and the PHS generally agreed with the report.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

INTRODUCTION....1

Purpose....1

Background....1

Methodology....2

FINDINGS....4

Over One-Quarter Million Adolescents, Primarily Males, Use Or Have Used Steroids, And Their Numbers Are Growing....4

Adolescent Steroid Use Starts Early And Often Follows A Prolonged, Intense Pattern....5

Adolescent Steroid Use Is Motivated By Socially Acceptable Values And Life-Stage Concerns With Appearance And Peer Approval....6

Adolescents Are At Special Risk For Some Adverse Results Of Steroid Use....8

Although Much Remains Unknown, Experts Link Steroid Use To Serious Psychological And Physical Health Risks....9

Experts Recommend Education Of Adolescents And Adults As The Best Solution To The Steroid Use Problem....12

Testing And Controlled Substance Status Are Potential Deterrents To Non-Medical Steroid Use....15

RECOMMENDATIONS....18

Develop A National Steroid Education Strategy....18

Conduct Further Medical And Scientific Research....18

COMMENTS....19

ENDNOTES....20

BIBLIOGRAPHY....21

APPENDIX A: Key Informant Interviews ..... A - 1

APPENDIX B: Steroid User Interviews ..... B - 1

APPENDIX C: Steroid Incidence of First Use ..... C - 1

APPENDIX D: Estimate of Student Steroid Use by Grade ..... D - 1

APPENDIX E: Departmental Comments. ..... E - 1

APPENDIX F: Public Comments ..... F - 1

INTRODUCTION

PURPOSE

To describe the non-medical use of steroids by adolescents and to suggest appropriate education or intervention strategies as well as areas needing further research.

BACKGROUND

Anabolic-androgenic steroids ("steroids") are synthetic derivatives of the natural male hormone testosterone. The androgenic effects of testosterone are increased aggressiveness, the growth of the male reproductive tract during adolescence, and the development of secondary male characteristics such as increased body/facial hair. The anabolic effects are the retention of dietary protein and increased muscle mass. An effect during puberty is the stimulation of long bone growth with subsequent epiphyseal[1] closure. Although separating the androgenic and anabolic effects is difficult, most who use steroids for non-medical reasons want to maximize the anabolic properties to improve their strength, appearance, and/or capacity to train. Unlike "recreational" drugs, such as cocaine, steroids do not produce an immediate euphoria at the time of use.

Use in combinations and cycles

Steroids are administered either orally or by injection. A common practice of non-medical use is to "stack" steroids, i.e., to combine several steroids, usually at least one oral and one injectable, in an effort to saturate receptors that can stimulate growth. Dosages often greatly exceed the usual therapeutic amounts and may include products intended for veterinary use. Some users "cycle" the drugs by taking them for 4 to 18 weeks, then discontinuing them for several months; others take steroids continuously.

Illegal activity increases

Steroid possession and distribution for non-medical purposes is illegal under Federal law. The Food and Drug Administration (FDA) has approved steroids as drugs which may be prescribed only by a licensed physician for specific purposes. Steroids have limited approved uses, such as the treatment of certain anemias, breast cancer, male hypogonadism, and delayed adolescence in boys. Congress passed the Anti-Drug Abuse Act of 1988 which includes several provisions to control the distribution of steroids for non-medical purposes. For a limited time in 1989 the Office of Inspector General (OIG) was delegated the authority to conduct investigations of illegal distribution of steroids. In November 1990 steroids were added to Schedule III of the Federal Controlled Substances Act, making steroid distribution and possession without a prescription illegal.[2]

The non-medical use of steroids is not a new issue, but the user population seems to be expanding. Beginning in the early 1950's steroid use appeared confined to world class and professional athletes, but more recently, steroid use has increased significantly among amateurs. In December 1986, for example, 26 college football players, from at least 7 universities, were barred from post-season bowl games after testing positive for steroids. Evidence has shown that high school, and even junior high school, students also use steroids.

Serious health risks suggested

At the same time, researchers are discovering the potential for serious health risks of steroid use. No systematic studies of the health risks to athletes or body builders, who use steroids at higher than therapeutic doses, have been conducted. Health risk data do exist, however, from medical case studies and from a limited number of case reports on athletes. Suggested side effects range from acne or fluid retention to mood swings, temporary sterility, cardiovascular disease, and liver disease. Some risks may be even greater for adolescent users because of their developmental stage. Since some steroids are injected, researchers suggest an incidental health effect of steroid use may be contracting AIDS through the shared use of contaminated needles.

METHODOLOGY

This inspection focuses on non-medical steroid use by adolescents according to four major sources: the National Institute on Drug Abuse (NIDA), professional and original research literature, interviews of 30 key informants knowledgeable in steroid issues, and interviews of 72 current or former steroid users. Since scientific inquiry in the study area has been limited, findings are based on the compilation of the best available research information from NIDA and other professional sources and of anecdotal data we gathered from key informants and users.

Each year NIDA sponsors a national high school senior survey (1). In 1989, for the first time, the survey included questions concerning non-medical steroid use. We examined the preliminary data on national steroid use as reported by the high school class of 1989. We also completed a content analysis of the recent literature (see Bibliography). This analysis examined incidence/prevalence of steroid use, motivations for adolescent use, use patterns and trends, health risks associated with steroids, and education/intervention strategies.

We collected data from 30 well-known key informants by using in-depth, structured interviews. We selected these respondents based on their prominence in professional or research literature (16 had written material we used for our content analysis), their professional affiliations, or recommendations by other key informants. Their areas of expertise are medicine, education, substance abuse, drug testing, sports, and/or coaching (see Appendix A for a complete listing). They have been involved with the steroid issue in some way for 8 years, on average. Twenty-seven have personal contact with current or former steroid users in various age groups and levels of athletic competition.

We also collected detailed data on use patterns and motivations from 72 steroid users (55 current and 17 former). We contracted with three key informants to complete confidential, in-depth

interviews using our instrument (see Appendix A). The current or former users, selected judgmentally by the interviewers, met three criteria: 1) age 25 or younger at the time of the interview, 2) initiated steroid use in high school or younger, and 3) completed at least one steroid cycle of 6 weeks or longer (see Appendix B). Detailed findings from these interviews are presented in a separate report entitled "Adolescents and Steroids: A User Perspective," OEI 06-90 01081.

FINDINGS

Over One-Quarter Million Adolescents, Primarily Males, Use Or Have Used Steroids, And Their Numbers Are Growing.

➤ ***Mounting evidence indicates significant numbers of adolescents use steroids.***

The NIDA survey, the only national data base in this study area, reported 3 percent of the Class of 1989 had used steroids in their lifetime. Three earlier studies of high school students, not nationally representative, showed similar rates ranging from 3 percent to 5.7 percent (see Table 1 on page 4). In 1988, William E. Buckley et al. reported 6.6 percent of *male* high school seniors use or had used steroids in their lifetime (2).

Using the NIDA lifetime incidence of 3 percent, we can estimate that 83,430 students from the Class of 1989 used steroids at some time.[3] Further, we calculate approximately 262,000 students in grades 7 to 12 in 1989 used or had used steroids.[4] Buckley et al., at a 6.6 percent incidence for males, estimated 250,000 to 500,000 male adolescents in secondary schools probably use or have used steroids.

Some key informants suggest, however, these rates may be underreported. The NIDA data, for example, do not include information from school drop-outs. Dr. Charles Yesalis, a steroid researcher, said that the secrecy involved in steroid use is so great that it must be a methodological consideration when designing steroid studies (3).

➤ ***Usage rates are much higher for adolescent males than females.***

The NIDA data show, as do other studies, that adolescent males use steroids at a higher rate than adolescent females. The range is 4.7 percent to 11.1 percent for males and only 0.5 percent to 2.5 percent for females (see Table 1). Two-thirds of the key informants agree 5 percent to 11 percent of high school males have used steroids. No one thought this range was "very high". Other studies show that male users are usually athletes with 65 to 84 percent participating in sports (4). Ninety-six percent of our users were in a competitive sport or weight-training program at the time they began steroid use.

TABLE 1
Summary of Steroid Usage Data*

STUDY	GRADE	TOTAL	MALE	FEMALE
NIDA - 1990	12	3.0	4.7	1.3
Buckley et al. - 1988	12	-	6.6	-
Johnson et al. - 1989	11	5.7	11.1	0.5
Windsor/Dumitru - 1989	9 - 12	3.0	5.0	1.4
Terney/McLain - 1990	9 - 12	4.4	6.5	2.5

* Percent of adolescents who use or have used steroids

FINDINGS

Over One-Quarter Million Adolescents, Primarily Males, Use Or Have Used Steroids, And Their Numbers Are Growing.

➤ ***Mounting evidence indicates significant numbers of adolescents use steroids.***

The NIDA survey, the only national data base in this study area, reported 3 percent of the Class of 1989 had used steroids in their lifetime. Three earlier studies of high school students, not nationally representative, showed similar rates ranging from 3 percent to 5.7 percent (see Table 1 on page 4). In 1988, William E. Buckley et al. reported 6.6 percent of *male* high school seniors use or had used steroids in their lifetime (2).

Using the NIDA lifetime incidence of 3 percent, we can estimate that 83,430 students from the Class of 1989 used steroids at some time.[3] Further, we calculate approximately 262,000 students in grades 7 to 12 in 1989 used or had used steroids.[4] Buckley et al., at a 6.6 percent incidence for males, estimated 250,000 to 500,000 male adolescents in secondary schools probably use or have used steroids.

Some key informants suggest, however, these rates may be underreported. The NIDA data, for example, do not include information from school drop-outs. Dr. Charles Yesalis, a steroid researcher, said that the secrecy involved in steroid use is so great that it must be a methodological consideration when designing steroid studies (3).

➤ ***Usage rates are much higher for adolescent males than females.***

The NIDA data show, as do other studies, that adolescent males use steroids at a higher rate than adolescent females. The range is 4.7 percent to 11.1 percent for males and only 0.5 percent to 2.5 percent for females (see Table 1). Two-thirds of the key-informants agree 5 percent to 11 percent of high school males have used steroids. No one thought this range was "very high". Other studies show that male users are usually athletes with 65 to 84 percent participating in sports (4). Ninety-six percent of our users were in a competitive sport or weight-training program at the time they began steroid use.

TABLE 1
Summary of Steroid Usage Data*

STUDY	GRADE	TOTAL	MALE	FEMALE
NIDA - 1990	12	3.0	4.7	1.3
Buckley et al. - 1988	12	-	6.6	-
Johnson et al. - 1989	11	5.7	11.1	0.5
Windsor/Dumitru - 1989	9 - 12	3.0	5.0	1.4
Terney/McLain - 1990	9 - 12	4.4	6.5	2.5

* Percent of adolescents who use or have used steroids

➤ ***Adolescent steroid use is growing according to key informants and users.***

Overall, both key informants (67%) and users (93%) believe steroid use is increasing among senior high school students. Supporting evidence comes from Portland, Oregon where researchers evaluated high school varsity football players over the three academic years of 1987 to 1989. In that brief time, the percentage of self-reported steroid use more than tripled, rising from 1.1 percent to 3.8 percent (5). Key informants (60%) and users (57%) also believe use is rising among junior high school students although both groups are less sure of the use trend for younger students. Inclusion of steroid use questions in subsequent annual NIDA high school senior surveys will yield trend data for both junior and senior high school students.

Adolescent Steroid Use Starts Early And Often Follows A Prolonged, Intense Pattern.

➤ ***First use occurs by age 16 for over half the adolescents who try steroids.***

Many adolescents, who use steroids, have tried them for the first time by age 16. Fifty-three percent of our user sample report they had started at age 16 or younger; 85 percent had started by age 17. NIDA reported that 56 percent of the male users first tried steroids by 10th grade (age 15 to 16) or younger (see Appendix C). Another 22 percent had started use by 11th grade (age 16 to 17) for a cumulative rate of 78 percent. The female incidence of first use follows the same pattern. The Buckley et al. data for males tracks our user data and NIDA's and shows 71.3 percent started by age 16.

➤ ***Adolescents appear at risk for heavy, prolonged use.***

Twenty-six key informants (87%) predict that an adolescent user who completes one 6-week steroid cycle is likely to go on to use for 5 cycles or more. Five cycles is a significant number because for some researchers it marks the beginning of "heavy" steroid use (6). Further, once users cross the 5-cycle mark, many key informants believe they will continue use for years afterwards.

Most users in our sample are "heavy" users according to this research definition. Sixty-five percent of users report they have taken steroids for five cycles or more in their lifetime.[5] Their lifetime average is eight cycles. The average length of their last completed cycle is 11 weeks. Current users started taking steroids 3 years ago on average; 35 percent have used steroids for 4 years or longer. Eighty-six percent have no definite plans to stop using.

➤ ***Many users increase steroid dosages, variety and cycle length over time.***

Most of our users also say they progressively intensified their steroid use. Over time they used larger dosages (89%), increased the number of different steroids per cycle (72%), lengthened their cycles of use (64%) and shortened the time between cycles (65%). Other signs of their intense steroid use are: 1) steroid doses greatly exceed the normal therapeutic levels, 2) 99

percent of the users inject steroids, and 3) users combine an average of 5 different steroids in one cycle.

Adolescent Steroid Use Is Motivated By Socially Acceptable Values And Life-Stage Concerns With Appearance And Peer Approval.

Key informants perceive that steroid use, in general, is uniquely motivated by values society normally considers "good". They think adolescents may be more vulnerable to steroid use because of these societal values and their own strong concerns about appearance and peer approval. Although the percentage of adolescents who use or have used steroids is low compared to some other drugs,[6] nearly two-thirds of the key informants still rank non-medical steroid use as a major (27%) or moderate (37%) problem precisely because these values and concerns lead adolescents to steroid use.

➤ ***Steroid users have more positive motivations than other drug users.***

Twenty-two of 29 key informants characterize steroid use as a unique substance abuse problem. They describe steroid users, in general, as highly motivated people who are trying to improve themselves or to achieve a positive goal. They want to be better athletes, even champions; they want to look better. Steroid users believe that they take care of their bodies and that they are health conscious.

Unlike other drug users, who frequently have negative or no goals, steroid users do not seek to escape reality or to attain instant gratification. In fact, steroids do not produce an immediate euphoria at the time of use. Athletes and appearance conscious individuals know they must train intensely to reach their goals, and they are willing to make that effort. They see steroids as a way to approach their goal faster or to attain an even higher level of performance. If there is a negative motivation underlying steroid use, it is "an over-reliance on physical attributes for obtaining a sense of self-worth." (7)

➤ ***Adolescent concerns with appearance and peer approval motivate their steroid use.***

For adolescent males, muscularity and strength are two key ingredients of their perceived success and favorable self-esteem. Appearance is also an important factor. The users, key informants and literature all say the desire to do well in sports, or its variations of increasing strength, size and speed, lead adolescents to steroid use. All the key informants and nearly two-thirds of the users also report improving appearance as a reason for starting steroid use. Matching perceived use by competitors was also mentioned often by both groups. However, while all the key informants say monetary rewards, such as scholarships, are a motivation to use steroids, only 24 percent of the users report this reason. More compelling to them is the desire to be happier or like themselves better (53%).

Peer group involvement is very important during adolescence. In fact, peers are listed the most frequently by our key informants as the key influence on adolescents to use steroids. The users

strongly agree saying they were influenced to begin steroid use primarily by friends or athletes at the gym where they work out (53%) and by school friends (40%). In most cases, the friend was a user who had achieved the results that our respondent desired. Further, non-participating peers don't discourage use. Seventy-three percent of our users agree with the statement, "My friends, who don't use steroids, don't care if I use."

➤ ***Steroids work, producing physical and other effects that adolescents desire.***

Almost all of our key informants believe that steroids do produce the effects adolescents perceive as beneficial. In combination with a proper regimen of training and nutrition, they say steroids are effective for increasing muscle mass (97%), strength (97%) and training capacity (93%). Most also believe steroids and a proper regimen increase speed (67%) and enhance sexual capacity or enjoyment, at least initially (57%). They agree steroids do not increase cardiovascular endurance (60%) or prevent injuries (80%). In addition, the American College of Sports Medicine, which does not advocate steroid use, officially concedes that concurrent use of steroids with proper training and diet may enhance performance.

Current and former users strongly agree that steroids work. Sixty-four users (89%) report they got the results they hoped for when they started using and note they "really improved physically." They cite large, measurable gains in weight, muscle mass and definition, strength and athletic accomplishments. Among users who achieved the desired results, 97 percent agree that the physical effects encouraged them to continue using steroids. Improved appearance and increased sexual drive, prowess or pleasure are examples of unexpected benefits mentioned by 43 percent of users. Although former users are less enthusiastic, most current users believe the emotional and social benefits of physical improvement are getting along better with others, greater satisfaction with life and being liked better by their peers.

➤ ***Adults and famous role models also reinforce steroid use.***

Key informants also believe responsible adults, in addition to peers, influence steroid use. They list parents, coaches/trainers, successful athletes or entertainment personalities that act as role models, and society in general as sources of influence or pressure for an adolescent. They say that, whether intentional or not, parents and coaches place great pressure on young people to compete and win, while sending a mixed message of what are acceptable ways to accomplish that goal. At other times the message is clear that using steroids to enhance performance is acceptable when our society praises winning, accords athletes special treatment, and overlooks their transgressions.

The users' responses indicate that adults indirectly encourage adolescent steroid use by sending mixed messages. Fifty-five percent agree with the statement "My parents probably know I use (or used) steroids," although 93 percent also agree that "My parents believe getting good grades is more important than winning at sports." Only 59 percent say good grades are more important than winning at their schools. Of the 41 users who have coaches, 61 percent *disagree* with the statement, "My coaches *really* believe that steroid use is a bad idea." However, our users seldom associate adults they know personally with motivation to begin steroid use: non-school

coach/trainer (15%), school coach/trainer (6%), personal doctor (6%). No one reports parents as a motivation.

Famous role models also influence adolescents. The users believe that many high-level athletes have used steroids, and 42 percent say this influenced them to start using. Fifty-seven percent pointed to "muscle magazines" and seven percent to entertainment personalities as sources of influence.

A researcher/physician aptly summarizes the interplay of societal influences and values on a potential adolescent steroid user.

> *Young males with a tendency towards high risk behaviors, for whom physical attributes have a high personal value, may be at most risk for initial use. Social influences from peers, coaches, trainers and family as well as prevailing cultural values to compete, to win, to look good,and to be big and powerful probably also contribute to initial use.*(7)

Adolescents Are At Special Risk For Some Adverse Results Of Steroid Use.

➤ ***Key informants believe adolescent users are more susceptible to some health effects.***

Twenty-seven of 30 key informants believe that adolescents who take steroids, as opposed to adults, are at special risk for adverse results. Twenty say they are most worried about stunted growth and adverse psychological effects including dependence. Adolescent steroid use may hinder long bone growth and the subsequent epiphyseal closure at puberty. Further, the developing adolescent may be especially vulnerable to the psychological effects of steroids, such as the possible drug-induced mood changes (8). Our key informants are also concerned generally about the potential for serious health risks of steroid use which we discuss in detail beginning on page 9.

➤ ***Steroid use encourages adolescents to try other drugs.***

The key informants and literature suggest steroid use leads adolescent users to other drugs. Twenty-three of 30 key informants believe that other drugs taken to enhance performance (human growth hormone, amphetamines, erythropoietin) also have the same abuse potential as steroids, assuming cost and availability are not prohibitive. Nearly half of our key informants think it is likely that adolescents can also obtain marijuana and cocaine from their steroid source. In addition, handbooks available to adolescents suggest ways to counter the side effects of steroid use with other drugs often available on the black market, e.g., estrogen inhibitors for gynecomastia, diuretics for fluid retention, human chorionic gonadotropin (HCG) to stimulate natural testosterone production (8).

Our user data support the key informants and the literature. Forty-four percent of the users consult a user's handbook for steroid information, apparently the same handbook that discusses countering the side effects of steroids. After starting steroids, 49 percent of the users started other drugs for performance enhancement or for countering the side effects of steroid use. Expressed as a percentage of all sampled users, they added estrogen inhibitors (31%), HCG (22%), diuretics (17%), "uppers" including amphetamines (17%), pain-killers (15%) and recreational drugs other than alcohol (11%).

Before starting steroids, nearly two-thirds of the users report drug use, but of a different type. They used alcohol (65%), marijuana (26%) and nicotine (14%). A few mention "uppers" (4.2%) and pain-killers (1.4%). None report use of diuretics, estrogen inhibitors or HCG.

Although Much Remains Unknown, Experts Link Steroid Use To Serious Psychological And Physical Health Risks.

- ***Key informants emphasize they do not understand enough about the effects of steroid use.***

Sixty-five percent of our key informants feel that expert understanding of the short-term effects of steroid use is "good" or "very good." On the other hand, 96 percent say expert understanding of the long-term effects of steroid use is "fair" to "very poor." Many strongly favor further systematic medical research of steroid effects as an underpinning for well-conceived educational programs and future legislation to control steroid distribution and use. A common sentiment of researchers and physicians is, "It would be a waste of money to put more effort into seeing if steroids work. We need other knowledge [about short- and long-term] effects urgently." (3)

We asked our physician/researcher group whether, in their professional opinion, short-term steroid use (less than one year) or long-term use is linked either strongly, weakly or not at all to a wide variety of adverse health effects. Many perceive links but carefully qualify their answers overall or by each health effect being rated. A summary statement from other research that well describes their qualifications also is,

> *The presence and magnitude of anabolic or androgenic effects and complications of steroid use depend on the specific drugs taken, the size and frequency of doses, the duration of use, the route of administration, and the age and health of the user. Individual responses to different steroids vary. Acute, life threatening side effects are exceedingly rare. Long-term deleterious effects are unknown.* (8)

- ***The risk of steroid addiction is of particular concern for adolescent users.***

Addiction to a substance can be a psychological and/or physical dependence. Many key informants believe adolescents who use steroids are at a special risk for adverse psychological effects. In fact, the physician/researcher group, when ranking the health risks of steroid use

report, in their judgment, a strong link, for short-term and long-term use, between steroid use and psychological dependence. To date, research has not shown a link between steroid use and physical dependence, but many key informants from the physician/researcher group believe physical dependence is a potential effect. Although not yet conclusive by the standards of scientific research, in our opinion, sufficient evidence does exist in literature to raise the serious possibility that steroids are addictive.

Buckley et al. describe the intensity and pattern of steroid use by 226 adolescent males (2). Thirty-eight percent first used steroids at age 15 or younger; another 33 percent had started by age 16. Forty percent of the users reported 5 cycles or more of use. Forty-four percent took more than one steroid at a time; 38 percent used both oral and injectable forms of steroids. They commented, "When one considers [this data], it is clear that the potential for the development of long-term use patterns is real."

To develop the dependence issue, Dr. Charles Yesalis, a principal investigator of the Buckley et al. research team, further analyzed the survey data (6). One-quarter of the 226 self-reported users, when faced with health risk scenarios related to steroid use, stated their intentions to continue use regardless of dire health consequences such as permanent sterility, heart attacks or liver disease. He also noted their use of injectable steroids indicated "an increased level of commitment." Sixty-three percent of the early initiators reported 5 cycles or more and were more likely to exhibit symptoms consistent with habituation: unwillingness to stop use, perceptions of benefits of use, rationalization of use and overlooking of health risks.[7]

Psychiatrist Kirk Brower has also studied the issue of steroid addiction. He believes that the adolescent users in the Yesalis analysis above show evidence of addictive thinking and that up to 25 percent of adolescent steroid users at a given time are possibly dependent (7). In another work Brower et al. interviewed 45 weightlifters who admitted steroid use for a mean of 26 months (including time between cycles) and with a mean of 2.8 different steroids at one time, exceeding therapeutic doses (9). A self-administered questionnaire elicited information on standard symptoms of dependence.[8] At least one dependent symptom was reported by 93 percent. Three or more symptoms, consistent with a diagnosis of chemical dependency, were reported by 58 percent.

➤ ***Many steroid users in our sample exhibit addictive thinking or behavior.***

By applying the addiction criteria from the literature to our self-reported user data, we find evidence of addictive thinking and behavior. As we have seen, their use patterns are long and intense, i.e., 65 percent have used for 5 cycles or more, 86 percent take 3 or more steroids at a time, 91 percent use both oral and injectable steroids. Furthermore, quitting steroid use does not appear likely for many current users: most have no definite plans to stop using steroids (86%), many would not stop even if others do (78%), and they wouldn't stop use even if they were convinced steroids are really bad for their health (38%). One-quarter of current users tried to quit but couldn't (9%), quit use completely for a while but started again (22%) or did both. Further, nearly all say starting steroid use was a good decision (93%) which they would repeat if they had to decide again (87%).

The users also seem to over-look or rationalize the effects of steroid use. Fifty-three percent say they got along better with others while using steroids, but the same users also say they had more arguments or physical fights. Twenty-five percent sold steroids to pay for their own. Eighty-two percent of current users (but only one former user) disagree with medical experts and professional athletes who have said steroid use can cause serious health problems. At the same time, many former and current users report physical changes in themselves that they attribute directly to their steroid use: bloated appearance (75%), shrinking testicles (61%), breast development in males (42%), breast reduction in females (50%), bone/joint pain (28%), difficulty sleeping (22%), frequent urge to urinate (17%) and nosebleeds (10%). Finally, 87 percent of current users agree the bad effects will go away as soon as use is stopped, but only 41 percent of former users agree the effects go away.

➤ ***Experts also link steroid use to other serious psychological effects.***

Other possible adverse psychological effects of steroid use include increased irritability, violent behavior, depression, mania, psychosis, and suicide (or attempted suicide). All of these are to some degree linked to steroid use in the opinion of our physician/researcher group. They believe there are strong links, for short-term and long-term use, to increased irritability and violent behavior. Depression is strongly connected by them to long-term use. Psychotic and/or manic symptoms and suicide are linked, with no consensus in degree, to both short and long-term use.

Similar to addiction, evidence does exist in literature to support a real possibility that steroids cause other psychological effects. Drs. Harrison Pope and David Katz questioned 41 bodybuilders and football players who had used steroids (10). Having no histories of past psychiatric difficulties, five subjects met the criteria for psychotic episodes and 5 for manic episodes during periods of steroid use. No subject described comparable behavior when they were not using steroids.[9] Dr. Mark Humbert found a relationship between steroid use and mood states (11). Mood scores of athlete users changed significantly after 4 weeks of steroid use and approached pretest measures 4 weeks after discontinuing use. While using steroids, athletes reported to Humbert a decrease in vigor and increases in hostility, anxiety, confusion, depression, and fatigue.

Users report indications of adverse psychological effects. Fifty-one percent had more arguments or physical fights while using steroids. Twenty-five percent report doing serious damage to property or a person either in anger or "for fun". Sometimes they were very sad (28%); 3 users even seriously considered suicide. Finally, 6 of the 17 former users say one of the main reasons they stopped was they experienced undesirable behavioral or emotional effects.

➤ ***Key informants link several negative physical health effects to steroid use.***

We asked our physicians/researchers about links between steroid use and physical health problems just as we asked about psychological health problems. With the same qualifications described on page 9, they do believe adverse physical health effects stem from steroid use. For both long-term and short-term use they consistently see strong linkages between steroids and acne, fluid retention, gynecomastia (breast development in males), masculinization in females,

reversible sterility (males), increased LDL (bad cholesterol), decreased HDL (good cholesterol), and high blood pressure. They also perceive strong links between long-term use and baldness, increased chance of injury to muscles, tendons and ligaments, and liver problems. They see no link between short-term steroid use and permanent sterility in males.

For other physical health effects, expert opinion is somewhat less certain. Although there is no consensus as to the degree of linkage, they do perceive links between short- and long-term steroid usage and sexual problems/impotence, stunted growth and prostate problems. The same is true for their opinion of short-term use and increased chance of injury to muscles, tendons and ligaments and liver problems. For long-term use, they see links, without a consensus on degree, to cardiovascular disease, kidney problems and cancer. No consensus emerged for long-term steroid use and possible links to permanent male sterility, or for any linkage between steroid use and accelerated aging of the skin or immune system problems.

Despite the dearth of research on the effects of steroids, a final thought offered by a key informant is noteworthy:

> *These drugs are too powerful not to have some damaging effects associated with long-term use, and it is imprudent to assume that athletes are immune to the deleterious effects that are seen in animals.*(3)

Experts Recommend Education Of Adolescents And Adults As The Best Solution To The Steroid Use Problem.

➤ ***Key informants do not believe adolescents are well aware of the risks of steroid use.***

Adolescents are not perceived as knowledgeable about the potential dangers of steroids. Two-thirds of our key informants believe junior high school students are "somewhat unaware" (33%) or "very unaware" (33%) of the potential risks of steroid use. They rate senior high school students' knowledge better with 27 of 30 key informants saying the older students are "somewhat aware" (47%) to "somewhat unaware" (43%). Terney and McLain reported nearly 55 percent of the high school students they surveyed were not aware of the medical risks associated with steroid use (12). Johnson et al. found 22 percent of male, high-school users did not know of *any* complications associated with steroid use (13).

Our users, with an average age of 20, know more about the medical risks of steroid use than the above subjects. All could name at least three serious health problems medical experts and professional athletes say may be caused by steroids. Two-thirds could name more than three health problems.

➤ ***Knowledge of potential health risks alone is not a deterrent to steroid use.***

A frustrating aspect of adolescents' knowledge of steroids is that, even when they are aware of potential health risks, that awareness does not deter steroid use. Eighteen of 30 key informants rate knowledge of risks as ineffective in steering adolescents away from the drugs. The primary reason given is the general tendency for increased risk-taking by adolescents — the "it can't happen to me" syndrome. Other important reasons offered by our key informants are adolescent perceptions that the rewards of steroid use outweigh the risks and that the medical community was wrong previously in saying steroids don't work.

The medical community's loss of credibility is important when discussing adolescent steroid use and possible strategies for deterring use. Prior to 1984, experts repeatedly denied, based on mixed results from earlier steroid studies, that steroids enhanced performance. In 1984, however, the American College of Sports Medicine revised its position on steroids to say that concurrent use of steroids with proper training and diet may enhance performance. Also in 1984 Haupt and Rovere reviewed the steroid literature and concluded that consistent improvements in muscle strength and size could result from steroid use in athletes who followed proper training and dietary regimens. Many physicians and scientists, however, still insisted any weight gained while taking steroids was mainly the result of fluid retention and that any strength gain was largely psychological.

As we mentioned earlier, 82 percent of current users disagree with medical experts and professional athletes who say steroid use can cause serious health problems. They disagree because neither they, nor other users they know, are experiencing health problems. Many also cite the lack of "hard evidence" to back up warnings (56%), their suspicion the warnings are merely scare tactics (38%) and previous statements by experts who say steroids don't work (27%). In sharp contrast, 16 of 17 former users agree with the experts that steroid use poses serious risks. Actually experiencing the negative health effects was a strong motivation for over half the former users to stop taking steroids.

➤ ***Nevertheless, experts say education is the most effective means of deterring steroid use.***

Nineteen of 28 key informants say that, overall, education is still the most effective means of deterring steroid use among junior and senior high school students. The adolescents themselves are mentioned most often by key informants as the appropriate targets of the educational effort. However, they say coaches, trainers, and parents should also be included. Only one former user reports disapproval by a coach or parent as a reason for stopping steroid use. Whether the adults didn't object to the steroid use or the objection was not heard seems immaterial next to fact that adults apparently are not playing as strong a role as they could in deterring use. Education was also suggested for other school personnel, and health care professionals, including physicians.

Coaches should be a specific target group for education according to literature and key informants. Coaches have special influence on a young person's life, yet sometimes they do not appear well informed or alert to the steroid problem. In 1988 Dr. E. James Swenson et al. published a survey of 474 high school varsity coaches (14). The coaches did not generally

consider steroid use to be a problem, with only 11 percent to 14 percent (for different school years) reporting some use among their athletes. This incidence rate is the inverse of the result reported by Buckley et al. who found evidence of use at 85 percent of their sample schools.

Swenson et al. also reported that, although about 70 percent of coaches felt informed about steroids, many, in fact, had misconceptions. For example, 45 percent felt steroids are effective in preventing injury. While most coaches would look for strength increase as an early sign of steroid use, less than half would look for irritability or fluid retention.[10] Thus, most coaches would be more likely to miss the early signs of steroid use. The researchers concluded the coaches were most likely uninformed and unaware of the true incidence of steroid use, but commented that possibly the coaches did not want to know the extent of the problem, as "it may cause them to take action that would effect their win-loss record."

➤ ***Honest, early, repeated, and clear messages improve steroid education programs.***

If steroid education is important but current efforts are not deterring steroid use, then what makes a steroid education program more effective? Our key informants say, more than anything else, we should tell adolescents honestly what we do and do not know about the effects and risks of steroid use. Scare tactics and continuing to say that steroids do not work are major errors because of the prior loss of credibility by the medical community and because adolescents know that steroids do work for the goals they have in mind, namely improved strength, muscularity and appearance.

We also need to recognize for educational purposes that adolescent steroid users are, in sociological terms, a "deviant sub-culture." Users are so secretive that some athletes would rather confess to cocaine use than to steroid use (3). Information about the drawbacks of use that comes from outside this culture has little influence on its members. In fact, in the past, the various educational and preventive measures seem to have been effective only in curtailing drug use to a degree, if at all, and driving it further underground (15). Our users say people who motivated them to use steroids and provide information about the drugs are predominantly their school and gym friends. Johnson et al. suggest that, since peers provide a major source of information concerning steroids, peer advice and education, which has been used effectively in other settings, may provide an effective intervention to limit steroid use (13).

Another strategy for improving the effect of steroid education is to deliver the message "early and often." As we have discussed, the data show that some adolescents start steroids at young ages and continue through high school. This suggests that junior high school or earlier is an appropriate time to begin steroid education. In addition, one educational session will probably not be a deterrent according to Dr. Linn Goldberg et al. (16). They assessed the steroid knowledge and attitudes of six varsity high school football teams before and after an education intervention. Four teams were included in the intervention and two teams were controls. Although students showed increased awareness of the adverse effects of steroid use after the education program, no differences in attitudes toward steroid use occurred as compared to the controls.

Simply supplying information about steroids is not enough. Dr. Mimi Johnson summarized a study by Gordon and McAlister which said that informational approaches to drug and alcohol use in the school systems have failed with no apparent decrease in use (8). "It is felt that these approaches do not address the reasons teenagers use the chemicals." Key informants and the National Consensus Meeting of Anabolic/Androgenic Steroids (17) agree regarding steroid education. They suggest an education program should:

- clearly and consistently send a message from coaches, parents, educators and physicians that they don't want adolescents to use steroids.
- help adolescents develop realistic expectations and goals for themselves and alternatives to steroid use, such as improved weight training methods, nutrition or training techniques,
- advocate and encourage social support for *not* using steroids, including a de-emphasis of winning at all costs and the social/monetary rewards attached to winning,
- encourage positive role modeling by elite and professional athletes,
- emphasize the moral and ethical aspects of steroid use, i.e., steroid use is cheating and destroys fair play.

Testing And Controlled Substance Status Are Potential Deterrents To Non-Medical Steroid Use.

- ***Most key informants would favor drug testing as a deterrent were it not for high costs.***

Many key informants would advocate testing as a deterrent to adolescent steroid use, but cost is a serious drawback. Twenty of 30 say, if cost were not a factor, they would advocate a large or moderate deterrent role for drug testing. When the 20 key informants considered cost, 16 then withdrew their support of steroid testing, saying it should have a small role or no role. Dr. Robert Voy, former director of sports medicine for the United States Olympic Committee, has said regarding testing and subsequent sanctions,

> *Some risk has to be associated with [steroid use].... Drug education in and of itself will not work. Without testing nobody's going to listen to education. The penalties don't have to be draconian, but there must be some penalties* (18)

The National Consensus Meeting of Anabolic/Androgenic Steroids participants went so far as to recommend encouraging the liability insurance industry to develop coverage for schools' drug testing programs in order to make drug testing more readily available at all levels of athletic

competition (17). They also support drug testing as an effective deterrent, but only in conjunction with a comprehensive program of education and rehabilitation.

Our key informants and other experts are also concerned about what constitutes an effective drug testing program. They say the essentials of a testing program are unannounced, random test times (possibly year-round and for all team members), assurances of accuracy, rehabilitation or counseling programs for "positives" and definite, pre-determined criteria for who will be tested. Many of these essential elements are expensive, plus, these elements and others raise legal and philosophical issues. In fact, the National Collegiate Athletic Association (NCAA) was legally challenged on these issues after their drug testing program went into effect in the fall of 1986.

While experts say random, unannounced testing is the only sure way to detect drug abuse, it is also one of the most controversial points. "It may be that random testing is appropriate for athletes at some level of competition, but not for others." (18) Further, the timing of drug testing corresponds poorly with drug taking and a significant number of users don't face drug testing at all (3). On the issue of accuracy, access to qualified laboratories is a problem. The advanced International Olympic Committee (IOC) testing techniques aren't available everywhere, and some believe "there's a clear difference in testing abilities between the IOC approved laboratories and private, commercial laboratories." (19)

Nine key informants opposed a substantial role for drug testing as a deterrent to steroid use even if cost were not a factor. Besides questioning the accuracy of testing, they also object to testing as an invasion of privacy, and a discriminatory practice that singles out one drug population. They also believe education is more important than testing.

➤ ***Limiting the supply could help control non-medical steroid use.***

Data on the growth of steroid use and the possible health consequences has produced efforts to shut down the steroid supply for non-medical use. The key informants believe the primary steroid sources for young users are peers and drug dealers, mainly in a commercial gym setting.[11] Users agree while adding pharmacists (31%) and mail order sources (28%). In November 1990 the Congress addressed the problem of non-medical steroid use by scheduling them under the Controlled Substances Act, making it illegal under Federal law to distribute and possess steroids without a prescription.

Twenty-one of 30 key informants and other experts see benefit in controlling steroids. The key informants believe controlling steroids holds physicians accountable for the drugs they prescribe, limits the supply of steroids manufactured in this country, and allows imposition of stricter penalties for use violations. Because of the record-keeping required, other experts believe diversion of supplies from legitimate domestic manufacturers (theft, resale by consumers, filling of fraudulent prescriptions)(4) to black markets will be harder (20).

Some key informants and other experts doubt scheduling will have much effect on the black market (20). For example, according to the Department of Justice, besides diversion from legitimate manufacturers, other sources of black market steroids are clandestinely manufactured goods, including counterfeits, and smuggled products (4). Other enforcement efforts, however,

appear to limit these black market sources. For example, during the 6 months the OIG had authority to conduct investigations of illegal distribution of steroids, 25 arrests and convictions resulted. Besides diversion of steroids from legitimate domestic manufacturers, OIG investigators identified criminal activities of counterfeiting brand-name steroids, smuggling steroids into the United States and domestic underground laboratories.

Sixty-three percent of our users say steroids are becoming harder to obtain. However, the perceptions of our key informants concerning the steroid supply vary widely. Some key informants believe all steroids are harder to obtain; others say high quality or real (non-counterfeit) steroids are more scarce. Of the 12 saying steroids are more scarce, the majority believe restrictive state laws and increased enforcement are the causes. An additional concern is that a declining supply is temporary, particularly if illicit drug dealers are including steroids in their operations.

RECOMMENDATIONS

Overall, our key informants, steroid users and literature review indicate that no single approach will solve the problem of adolescent steroid use. Rather, a solution lies within a strategy to improve education for adults as well as adolescents and to conduct additional medical and scientific research.

Develop A National Steroid Education Strategy

The Public Health Service is currently developing a national strategy for addressing the problem of non-medical steroid use. We recommend that it include the following elements: a national public awareness campaign using credible spokespeople, addition of steroid information to drug education curricula on all levels and issuance of guidelines for effective steroid education intervention at the local level. We also recommend aggressive testing by the NCAA, National Football League and other amateur and professional sports associations to promote steroid-free athletic competition at the college and professional levels, as this should have a significant educational impact on adolescents.

Key informants believe that education is the most effective means of deterring steroid use even though it doesn't always work. Education involves more, however, than merely presenting information about the effects of steroids to adolescents. The educational targets should include coaches, trainers, parents and medical professionals as well as adolescents. The educational message for adolescents must come early and be reinforced often in an honest, consistent way from their peers and responsible adults. We must find ways to overcome adolescent resistance to the message based on their own sense of immortality, the high degree of secrecy involved in steroid use, and the previous loss of credibility by the medical community. Finally, the educational intervention must be tailored to several audiences — the responsible adult vs. the adolescent, the potential user vs. the current user, the appearance user vs. the athletic user, the non-dependent user vs. the dependent user in conjunction with rehabilitation needs.

Conduct Further Medical And Scientific Research

The Department, through the Public Health Service, should take the Federal lead in conducting medical and scientific research on steroids. Current understanding of the ramifications of non-medical use of steroids is very limited. A pressing need exists to accurately identify the potential adverse health effects of short-term and long-term steroid use, particularly for adolescents. Such research should focus on adverse physical and psychological effects, especially, the risk of addiction. Because of the secrecy surrounding steroid use, innovative and unconventional research methods may be required. Another important need is to expand the available information on trends in the incidence and prevalence of adolescent steroid use and information on the knowledge, attitudes, beliefs, use patterns and motivations of adolescents. Continued, or even expanded, coverage of steroids in the NIDA annual survey of high school seniors is one means of building useful trend data on adolescent use.

COMMENTS

We received comments on the draft report from two Department of Health and Human Services entities - the Office of the Assistant Secretary for Planning and Evaluation and the Public Health Service. Our responses to their technical comments as well as the full text of their comments are in Appendix E. Public Comments are in Appendix F.

Office of the Assistant Secretary for Planning and Evaluation (ASPE)

The ASPE agreed with the report. In particular, they think "the report's highlighting of the fact that steroid use is motivated by socially acceptable values is very beneficial and should contribute to bringing this factor to the attention of those developing educational materials."

Public Health Service (PHS)

The PHS generally agreed with the findings and recommendations of the report. They believe hasty implementation of the recommendations would be inappropriate since the Interagency Task Force on Anabolic Steroid Abuse, in which they are active participants, has not finalized its report and recommendations for steroid regulation/enforcement, prevention/education, and research. The PHS specifically notes that while we stressed the PHS role in an education campaign, "it is important to recognize that any effort in this area will require coordination across Departments."

We agree with the PHS. In addition, we appreciate the opportunity they provided us to present our findings to the Interagency Task Force on Anabolic Steroid Abuse and to review the draft reports from the Task Force sub-committees on prevention/education and research. Their proposed activities match our recommendations. Like the PHS we believe a well-planned and coordinated approach to the problem of adolescent steroid use should take into account the work, now underway, of the Task Force. In addition, after we issued our draft report, Congress passed the Anabolic Steroids Control Act of 1990. Besides making steroids a controlled substance, this Act amends the Public Health Service Act to include the development and support of "innovative demonstration programs designed to identify and deter improper use or abuse of anabolic steroids by students, especially students in secondary schools." The implementing regulations are not yet written, but obviously these demonstration programs must also be considered in the Department's steroid prevention/education and research strategy.

ENDNOTES

1. Refers to the end of a long bone (epiphysis) composed of cartilage or separated from the bone shaft by a disk of cartilage; after the period of growth, bone tissue replaces the cartilage at the epiphysis to form a single bone with the shaft.

2. Each controlled drug is on one of five schedules depending on its potential for abuse and dependence. Schedule I drugs have the highest abuse potential and no accepted medical uses, e.g. heroin. Schedule III includes, besides steroids, stimulants, depressants, and narcotic drugs like codeine. Penalties for the illegal possession or distribution of scheduled drugs are prison sentences and/or fines.

3. 83,430 = 3% of 2,781,000 — the estimated number of graduates in the Class of 1989, according to the U.S. Department of Education.

4. Computed from 1989 enrollment data from the U.S. Department of Education and NIDA data on incidence of first steroid use by grade (see Appendices C and D).

5. We collected data only from those users who had completed *at least* one cycle of six weeks or longer.

6. NIDA reported for the Class of 1989 that the lifetime prevalence of use was 90.7% for alcohol, 43.7% for marijuana, 19.1% for amphetamines, 18.6% for inhalants, 10.3% for cocaine and 8.3% for LSD.

7. For similar and/or compatible results from other work, see Goldstein (29), and Fuller and LaFountain (27).

8. The American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R). Examples are withdrawal symptoms, continued use despite problems from use, more drug taken than intended, large time expenditure on drug-related activity, usual activities replaced by drug use, unable to cut down or control use.

9. Also see Pope and Katz (31) for a smaller case study in violent crimes linked to steroid use.

10. A complicating factor is steroid use may increase aggressiveness and tolerance of stress, both positives for some competitive sports.

11. According to Buckley et al. (2), Yesalis et al. (37), and Frankle et al. (26) the major source of steroids for non-medical use is the black market.

BIBLIOGRAPHY

A. PRIMARY

1. National Institute on Drug Abuse, Epidemiology Research Branch, Floor 11A, Parklawn Building, 5600 Fishers Lane, Rockville, MD 20857 by grant to the Institute for Social Research, University of Michigan, Ann Arbor, MI.

2. Buckley, William E. et al., "Estimated Prevalence of Anabolic Steroid Use Among Male High School Seniors," *The Journal of the American Medical Association*, vol. 260, n. 23, pp. 3441-3445, December 16, 1988.

3. Cowart, Virginia, "National Institute on Drug Abuse May Join in Anabolic Steroid Research," *The Journal of the American Medical Association*, vol. 261, n. 13, pp. 1855-1856, April 7, 1989.

4. United States General Accounting Office, "Drug Misuse: Anabolic Steroids and Human Growth Hormone," GAO-HRD-89-109, 1989.

5. Boyea, Steven et al., "Ergogenic Drug Use Among High School Athletes: A Three Year Sequential Study," abstract of work accepted for presentation at the annual meeting of the American College of Sports Medicine, May 1990.

6. Yesalis, Charles E. et al., "Anabolic Steroid Use: Indications of Habituation Among Adolescents," *Journal of Drug Education*, vol. 19(2), pp. 103-116, 1989.

7. Brower, Kirk J., "Rehabilitation for Anabolic-Androgenic Steroid Dependence," based on a paper presented at the National Consensus Meeting on Anabolic Androgenic Steroids, Los Angeles, CA, July 30-31, 1989.

8. Johnson, Mimi, "Anabolic Steroid Use in Adolescent Athletes," scheduled for publication in *Pediatric Clinics of North America*, vol. 37, n. 5, October 1990.

9. Brower, Kirk J. et al., "Physical and Psychological Dependence on Anabolic-Androgenic Steroids," Department of Psychiatry, University of Michigan, Ann Arbor, MI, for the Workshop Conference on Androgen Therapy: Biologic and Clinical Consequences sponsored by Penn State College of Medicine, Marco Island, FL, January 17-20, 1990.

10. Pope, Harrison G. and David L. Katz, "Affective and Psychotic Symptoms Associated with Anabolic Steroid Use," *American Journal of Psychiatry*, vol. 145, n. 4, pp. 487-490, April 1988.

11. Humbert, Mark D., "Psychological Effects of Self-Administered Anabolic Steroids on Male Athletes: Hostility, Depression, Vigor, Fatigue, Anxiety and Confusion," doctoral dissertation, United States International University, San Diego, CA 1990.

12. Terney, Rise and Larry McLain, "The Use of Anabolic Steroids in High School Students," Loyola University, May 1988; published in *American Journal of Diseases of Children*, vol. 144, January 1990.

13. Johnson, Mimi et al., "Anabolic Steroid Use by Male Adolescents," *Pediatrics*, vol. 83, n. 6, pp. 921-924, June 1989.

14. Swenson, E. James et al., "Perspectives on Anabolic Steroids: Survey of High School Varsity Football Head Coaches," Department of Family Practice, Michigan State University, a paper of 40 pages, May 1988.

15. Wright, James E. and Michael H. Stone, "Anabolic Drug Use by Athletes Literature Review," position paper on anabolic drug use by athletes, National Strength and Conditioning Association, 1985.

16. Goldberg, Linn et al., "Effect of an Anabolic Steroid Education Program on Knowledge and Attitudes of High School Football Players," *Journal of Adolescent Health Care*, vol. 11, n. 2, March 1990.

17. Report of the National Consensus Meeting of Anabolic/Androgenic Steroids, July 30-31, 1989, Los Angeles, CA, sponsored by the USOC, NCAA, National Federation of State High School Associations and the Amateur Athletic Foundation of Los Angeles.

18. Cowart, Virginia, "Drug Testing Programs Face Snags and Legal Challenges," *The Physician and Sportsmedicine*, vol. 16, n. 2, pp. 165-172, February 1988.

19. Cowart, Virginia, "Reflections on the Medical Aspects of the 1988 Olympic Summer Games," *The Physician and Sportsmedicine*, vol. 16, n. 12, pp. 118-123, December 1988.

20. Cowart, Virginia, "Would Controlled Substance Status Affect Steroid Trafficking?" *The Physician and Sportsmedicine*, vol. 15, n. 5, pp. 151-154, May 1987.

B. SUPPLEMENTAL

21. Amsel, Zili et al., "Anabolic Steroid Use Among Male High School Seniors -To the Editor," *The Journal of the American Medical Association*, vol. 261, n. 18, p. 2639, May 12, 1989.

22. Costill, D.L. et al., "Anabolic Steroid Use Among Athletes: Changes in HDL-C Levels," *The Physician and Sportsmedicine*, vol. 12, n. 6, pp. 113-117, June 1984.

23. Cowart, Virginia, "Physician-Competitor's Advice to Colleagues: Steroid Users Respond to Education, Rehabilitation," *The Journal of the American Medical Association*, vol. 257, n. 4, pp. 427-428, Jan 23/30, 1987.

24. Cronin, Barry, "The Steroid Menace," *Chicago Sun-Times* special reprint, February 1989.

25. Duda, Marty, "NCAA: Only 4 Percent of Athletes Used Steroids," *The Physician and Sportsmedicine*, vol. 13, n. 8, p. 30, August 1985.

26. Frankle, Mark et al., "Use of Androgenic Anabolic Steroids by Athletes - To the Editor," *The Journal of the American Medical Association*, vol. 252, n. 4, p. 482, July 27, 1984.

27. Fuller, John R. and Marc LaFountain, "Performance-Enhancing Drugs in Sport: A Different Form of Drug Abuse," *Adolescence*, vol. XXII, n. 88, pp. 969-976, Winter 1987.

28. Goldman, Bob, *Death in the Locker Room*, The Body Press, Tucson, AZ, 371 pages, 1984.

29. Goldstein, Paul, "Anabolic Steroids: An Ethnographic Approach," Narcotic and Drug Research, Inc., a paper of 36 pages, submitted to NIDA, 1989.

30. National Institute on Drug Abuse, agency contact for steroid issues: Lynda Erinoff, Ph.D., Room 10A-31, 5600 Fishers Lane, Rockville, MD, 20857.

31. Pope, Harrison G. and David Katz, "Homicide and Near-Homicide by Anabolic Steroid Users," *Journal of Clinical Psychiatry*, vol. 51, n. 1, pp. 28-31, January 1990.

32. Pope, Harrison G. et al., "Anabolic-Androgenic Steroid Use Among 1010 College Men," *The Physician and Sportsmedicine*, vol. 16, n. 7, pp. 75-81, July 1988.

33. Strauss, Richard H. et al., "Anabolic Steroid Use and Perceived Effects in Ten Weight-Trained Women Athletes," *The Journal of the American Medical Association*, vol. 253, n. 19, pp. 2871-2873, May 17, 1985.

34. Taylor, William N., "Synthetic Anabolic-Androgenic Steroids: A Plea for Controlled Substance Status," *The Physician and Sportsmedicine*, vol. 15, n. 5, pp. 140-150, May 1987.

35. Telander, R. and M. Noden, "The Death of an Athlete," *Sports Illustrated*, vol. 70, n. 8, February 20, 1989.

36. Windsor, Robert and Daniel Dumitru, "Prevalence of Anabolic Steroid Use by Male and Female Adolescents," *Medicine and Science in Sports and Exercise*, vol. 21, n. 5, pp. 494-497, February 1989.

37. Yesalis, Charles E. et al., "Incidence of the Non-Medical Use of Anabolic-Androgenic Steroids," a paper submitted to NIDA, 1989.

APPENDIX A

KEY INFORMANT INTERVIEWS

We completed our 54-question structured interview with each participant listed. During the pre-inspection phase of the study, we had also contacted many of them for information and assistance which they generously provided.

Neil Carolan, Dr. Mark Humbert and **Dr. James Wright** also completed the bulk of the steroid user interviews, the results of which are presented here and, in greater detail, in a companion report entitled "Adolescents and Steroids: A User Perspective," OEI 06-90-01081

➤ **Special Acknowledgement**

Our special thanks to **Drs. Linn Goldberg, Douglas McKeag, James Wright** and **Charles Yesalis** for their assistance in revising the discussion guides used to collect the study data. Also to **Drs. Lynda Erinoff and Beatrice Rouse** of NIDA for providing us their survey data and research information which was so important to this study.

➤ **Researchers and/or Physicians**

William Anderson, Ph.D.
Associate Professor, OMERAD
A-209 East Fee Hall
Michigan State University
East Lansing, MI 48824-1316

> ***Professional data:*** Instructor of medical students. Researcher on Buckley et al. study and others. Has co-authored own research on drug use among college athletes.

Kirk Brower, M.D.
Department of Psychiatry
University of Michigan Medical Center
U-H-8-D 8806, Box 016
Ann Arbor, MI 48109

> ***Professional data:*** Has done extensive research on psychological effects of steroid use. Participant at National Steroid Consensus meetings.

Don H. Catlin, M.D.
Chief, Clinical Pharmacology
Department of Medicine
UCLA Medical Center
Los Angeles, CA 90024-1735

Professional data: Director, Paul Ziffren Olympic Analytical Laboratory, UCLA; Associate Professor of Medicine and Pharmacology, UCLA; USOC, Committee on Substance Abuse, Research and Education; member, IOC's Medical Commission; former member, Soviet-American Drug Education and Anti-Doping Commission.

Karl E. Friedl, Ph.D.
Research Physiologist
U.S. Army Research Institute of Environmental Medicine (USARIEM)
Exercise Physiology Division, Room 253
Natick, MA 01760

Professional data: Wrote "Reappraisal of Health Risks Associated with the Use of High Doses of Oral and Injectable Androgenic Steroids" paper for NIDA. Was a panelist at the National Steroid Consensus Meeting.

Linn Goldberg, M.D.
Oregon Health Services University
3181 Southwest Sam Jackson Park Road
Room OPC 3370
Portland, OR 97201

Professional data: Conducted studies on effects of steroid education and on incidence/prevalence of steroid use in Oregon.

Bob Goldman, D.O.
High Technology Fitness Research Institute
2434 North Greenview
Chicago, IL 60614

Professional data: Author, *Death in the Locker Room*; Medical and Research Committee Director, International Federation of Body Builders; founder, High Technology Fitness Research Institute, Chicago; clinical instructor, Sports Medicine Department, Chicago College of Osteopathic Medicine.

Paul Goldstein, Ph.D.
Narcotic and Drug Research, Inc.
11 Beach Street
New York, NY 10013

Professional data: Has done ethnographic research on steroid use, and on steroids and violence.

Mark Humbert, Ph.D.
3351 East "G" Street, #19 E
Ontario, CA 91764

Professional data: Subject of Ph.D. dissertation was psychological (mood) effects of steroid use. Presently a staff psychologist at Youth Training School at Chino. Is a competitive body builder.

Mimi D. Johnson, M.D.
Washington Sports Medicine
11821 NE 128th Street
Kirkland, WA 98034

Professional data: Conducted incidence/prevalence study of steroid use by Arkansas high school students. Recent article on adolescent steroid use accepted for publication in *Pediatric Clinics of North America*. Faculty member at University of Washington; works as a team physician.

Larry G. McLain, M.D.
Parkside Sports Medicine Center
1825 Dempster Street
Park Ridge, IL 60068

Professional data: Conducted incidence/prevalence steroid study of Illinois adolescent users with Rise Terney.

Michael Nelson, M.D.
4801 McMahon NW
Suite 130
Albuquerque, NM 87114

Professional data: Chairman, Committee on Sports Medicine, American Academy of Pediatrics; has private pediatrics practice.

Harrison G. Pope, M.D.
McLain Hospital
115 Mill Street
Belmont, MA 02178

Professional data: Published researcher on psychological effects of steroid use; affiliated with Harvard University Medical School.

Richard Strauss, M.D.
Ohio State University
B108 Starling, Loving Hall
320 W. 10th Avenue
Columbus, OH 43210

Professional data: Editor-in-chief, *The Physician and Sportsmedicine;* published researcher in steroid use.

E. James Swenson, M.D.
Assistant Professor, Primary Care Sports Medicine
Department of Orthopedics
University of Rochester
Box 665
Rochester, NY 14526

Professional data: Conducted knowledge/attitude steroid survey of high school coaches. Worked with Anderson and McKeag at Michigan State University in their surveys of steroid use at the college level.

Robert O. Voy, M.D.
Medical Director
Las Vegas Institute of Physical Therapy and Sports Medicine
3650 S. Eastern Avenue, Suite 300
Las Vegas, NV 89109

Professional data: Former Director of Sports Medicine and Sports Sciences Division, United States Olympic Committee.

Gary Wadler, M.D.
Clinical Associate Professor of Medicine
Cornell University Medical College
1380 Northern Boulevard
Manhasset, New York 11030

Professional data: Wrote "Drugs and the Athlete" with Brian Hainline and contributed to similar printed work. Team physician, U.S. Open Tennis Championships. Spoke at Representative Levine's press conference with Ben Johnson regarding steroid use.

Deborah Waters, M.D.
United States Olympic Committee
1750 East Boulder Street
Colorado Springs, CO 80909

Professional data: Chief Medical Officer and Director of Sports Medicine

Robert Windsor, M.D.
4488 N. Shallowford Road, Suite 20
Atlanta, GA 30338

Professional data: Conducted adolescent steroid incidence and prevalence study (published) while at University of Texas Health Science Center, San Antonio with Daniel Dumitru.

James E. Wright, Ph.D.
9001 Eames Street
Northridge, CA 91324

Professional data: Prominent researcher in steroid use and effects for many years; published frequently.

Charles Yesalis, Sc.D.
Professor, College of Health and Human Development
Pennsylvania State University
115 Henderson Building
University Park, PA 16802

Professional data: Prominent published researcher in steroid use and effects; addressed National Steroid Consensus Meeting and participated in NIDA Technical Review.

➤ **Other Disciplines**

Neil Carolan
Vice President for Chemical Dependency Programs
Bry Lin Hospital
1263 Delaware Avenue
Buffalo, NY 14209

Professional data: Extensive counseling experience with adolescent steroid users.

Virginia S. Cowart
201 S. Blackstone Avenue
LaGrange, IL 60525

Professional data: Freelance writer on steroid issues; published extensively in Journal of American Medical Association and other journals. Co-authored a book on steroids with Dr. James Wright.

Dennis Degan
US Food and Drug Administration
Department of Health and Human Services
1560 East Jefferson Avenue
Detroit, Michigan 48207-3179

Professional data: National Steroid Coordinator, FDA and lecturer

Gayle Hatch
10255 Parkview Drive
Baton Rouge, LA 70815

Professional data: Director, Southern Regional Training Center, US Weightlifting Federation; member, Board of Directors, USWF

Ken Kontor, General Manager
National Strength and Conditioning Association
P.O. Box 81410
Lincoln, NE 68501

Simon McNeely, Secretary-Treasurer
Society of State Directors of Health, Physical Education and Recreation
9805 Hillridge Drive
Kensington, MD 20895

Robert E. "Skip" Morris, Executive Director
National High School Athletic Coaches Association
P.O. Box 941329
Maitland, FL 32794

Dick Stickle, Executive Director
National Federation TARGET Program Inc.
11724 Plaza Circle
P.O. Box 20626
Kansas City, MO 64195

Professional data: Affiliate of National Federation of State High School Associations

Frank Uryasz
Director of Sports Sciences
National Collegiate Athletic Association (NCAA)
6201 College Boulevard
Overland Park, KS 66211

Paul Zeek
Lamar University
P.O. Box 10115
Beaumont, TX 77710

Professional data: Acting Executive Director, National Athletic Trainers Association

APPENDIX B

STEROID USER INTERVIEWS

Steroid users are difficult to identify and contact for interviews. We initially tried to complete the interviews ourselves by installing a toll-free "800" telephone number and circulating our request for user interviews through our key informants. This produced only five qualified interviews despite assurances of confidentiality. We then contracted with three key informants, Neil Carolan, Dr. James Wright and Dr. Mark Humbert, to conduct in-depth interviews of steroid users who met three criteria: 1) age 25 or younger at the time of the interview, 2) initiated steroid use in high school or earlier, and 3) completed at least one steroid cycle of 6 weeks or longer. Otherwise, the interviewers judgmentally selected the users to interview.

Seventy-two steroid users (55 current + 17 former) provided information about themselves by completing a confidential, structured interview of 39 questions. All interviewers captured the self-reported user data on the instrument we designed and pre-tested, but they did not attempt to verify the factual accuracy of the users' answers. All personally conducted the interviews either face to face or by telephone.

The current and former users were 93 percent male with an average current age of 20 and an average initiation age of 16. They come from 10 states and from varied settings and locations within those states. Dr. Wright pointed out that he visited several counties for his 11 interviews in one state. Neither he, nor Dr. Humbert, simply concentrated on one commercial gym which caters to "hard core" bodybuilding and weightlifting training. Mr. Carolan, a substance abuse therapist, interviewed users who were referrals from other drug counseling programs, current clients, and word-of-mouth contacts limited to this project. Most were parent- or self-referred; none were court-referred.

APPENDIX C

STEROID INCIDENCE OF FIRST USE
National High School Senior Survey, Class of 1989
Sponsored by the National Institute on Drug Abuse*

Grade	Total	Male	Female
6 or below	0.1	0.3	0.2
7 to 8	0.3	0.6	—
9	0.5	0.7	0.4
10	0.5	1.0	—
11	0.8	1.0	0.4
12	0.8	1.0	0.2
Never Used	97.0	95.3	98.7

**For further information, contact Chief, Epidemiology Research Branch, National Institute on Drug Abuse, Floor 11 A, Parklawn Building, 5600 Fishers Lane, Rockville, MD 20857.*

APPENDIX D

ESTIMATE OF STUDENT STEROID USE BY GRADE

If we assume that the incidence of first use for the Class of 1989 is typical (see Appendix C), then we can estimate student steroid use by grade. Using enrollment data from the U.S. Department of Education, we calculate, that in the 1989 school year approximately 97,000 students tried steroids for the first time and that by the end of the 1989 school year approximately 262,000 students in grades 7 to 12 used or had used steroids.

Grade/Class # Enrolled	% First Use By Grade	# Students First Use By Grade	Cumulative School Year	Cumulative All Grades
6 or below 3,353,837 (grade 6)	0.1	3,354*	NA	NA
7 to 8 - Class of '94,'93 3,293,000 per class (approximate)	0.3	9,800	13,154	13,154
9 - Class of '92 3,564,104	0.5	17,821	30,975	44,129
10 - Class of '91 3,331,358	0.5	16,657	47,632	91,761
11 - Class of '90 3,161,609	0.8	25,293	72,925	164,686
12 - Class of '89 3,021,532	0.8	24,172	97,097	261,783

**Based on enrollment data for grade 6; data for incidence of first use by grades 1 through 6 individually is not available.*

APPENDIX E

DEPARTMENTAL COMMENTS
Technical Comments and Full Text

A summary of Departmental comments from the Office of the Assistant Secretary for Planning and Evaluation and from the Public Health Service and the OIG response begins on page 20. Our responses to their technical comments as well as the full texts of their comments follow.

Office of the Assistant Secretary for Planning and Evaluation

"The age cohort used in the estimate [of the number males and females who use or have used steroids] is students in grades 7 through 12. Given the findings in the IG's previous steroid report ("Adolescents and Steroids: A User Perspective") that the majority of users do not start until at least 15 years of age, including students particularly in grades 7 and 8 in the calculation could raise questions about the accuracy of the estimate."

We said in both reports that over one-half of our user respondents said they started using steroids by age 16, i.e., at age 16 or younger, not "until at least 15 years of age". The youngest age of steroid initiation in our sample was 13 years. These findings are consistent with data on incidence of first steroid use developed by NIDA and Buckley et al. We believe, therefore, the age cohort used in the estimate is a proper and reasonable choice.

Public Health Service (PHS)

The PHS points out legal distinctions for the terms "using, distributing or possessing with intent to distribute" steroids for non-medical purposes. They also note that FDA does not just approve a substance as a drug, but rather approves a drug for specific use(s). Finally, under the Controlled Substances Act, a drug is "controlled or scheduled," not reclassified.

We changed the report wording to reflect these distinctions.

The PHS notes the draft report uses information from a variety of sources but ambiguity arises throughout the document because statements are made without referring to the source. They cite an example in the Executive Summary. A related issue is the degree of certainty of the sources. An example is a section heading that commingles information of varying degrees of scientific credibility with subsequent explanations. The PHS recommends "It would be important to caveat more statements as to the degree of scientific certitude. Alternatively, a paragraph should be included indicating why different sources were required...."

We changed the main body of the report to clarify the information sources cited, i.e., literature, NIDA, key informants knowledgeable in steroid issues, and adolescent steroid users. We also amended the Methodology section. The Executive Summary and section headings are intended to be just a brief statement and outline of the report's main points, not a complete discussion of sources and findings.

The draft report makes no mention of the possibility of human immunodeficiency virus (HIV) transmission through needle-sharing although the companion document, "Adolescents and Steroids: A User Perspective", quotes a user who is HIV positive as the result of sharing needles.

The primary purpose of our study was to describe the patterns, motivations and direct health effects of steroid use. However, we have added, in the Background section, a brief discussion of contracting AIDS as an incidental health effect of steroid use. Regarding the user we interviewed who said he is HIV positive, please note we recorded what the users told us, but did not try to verify the accuracy of their statements. Users were assured of confidentiality as a pre-condition to being interviewed.

APPENDIX F

PUBLIC COMMENTS

Charles E. Yesalis, Sc.D., Department of Health Policy and Administration, Pennsylvania State University, is a nationally recognized steroid researcher. Below are excerpts from a letter he wrote us after he reviewed the draft report.

> *Overall the reports are well done and represent a valuable contribution to the literature. I do, however, have a concern with the report's conclusions on strategies to deal with this problem. Once again the central focus appears to be directed at the education of users or potential users of anabolic steroids. Much less attention is given to our social environment which, in my opinion, gives strong signals to our children to use these drugs. Your report states that anabolic steroids are not mood altering at the time of administration. You fail, however, to proceed to what I believe is the only logical conclusion: the appetite for these drugs has been created by our fixation on sport and physical appearance. Children do not have an innate desire to look like Mr. Universe nor do they by nature play games for the sole purpose of winning - we teach them this. Our youngsters look around and see numerous examples, both inside and outside of sport, of win at any cost, winner take all, and bigger is better. Anabolic steroids will help you win and they will make you bigger.*
>
> *...Our children are influenced by the adulation of fans and material rewards which often accompany success at the Olympic, collegiate and professional levels of sport. Moreover, because of reports in the news media as well as written and verbal testimonials by athletes, adolescents are very aware of the role anabolic steroids play in the success of many so called role-model athletes.*
>
> *Although the report acknowledges that anabolic steroids are capable of enhancing strength, size and capacity to train, the report once again stops short of an obvious conclusion: if you do not use these drugs, all else being equal, YOU WILL NOT WIN AS OFTEN.... This conclusion also has significant implications for strategies to solve the problem of steroid use among adolescents. If coaches are not willing to say with sincerity to their athletes, My opposition to steroids is so great that I am willing to lose every game rather than have any of you use steroids. this problem will continue. If parents, athletic directors and principals are not willing to support such a stance by coaches, this problem will continue.*